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THE PRIMARY CONCEPTS OF PHYSICS¹

THE subject of the present address is one that does not often appear on a scientific program. Physicists are so busy in enlarging the structure of knowledge that few of them concern themselves with the consideration of the fundamental concepts of the science. Yet it is plainly true that if those fundamental or primary concepts are not clearly apprehended, or if there is doubt as to what they are, the whole structure of the science rests on an insecure basis. I propose to examine certain questions concerning these primary concepts, about which there has been and is much unsettled opinion. The discussion necessarily rests upon my own beliefs about them. In the nature of the case each man can speak positively about them for himself only. It would be very improper to dogmatize, and I shall accordingly have to crave your pardon for a frequent expression of my own opinion, believing it less objectionable to be egotistic than to be dogmatic.

The first question which I shall consider is that raised by the advocates of the dynamical definition of force, as to the order in which the concepts of force and mass come in thought when one is constructing the science of mechanics, or in other words, whether force or mass is the primary concept. It will be of service in the discussion if we consider briefly the way in which some of the great builders of the science of mechanics used these concepts.

¹ Presidential address delivered before the American Physical Society and Section B of the American Association for the Advancement of Science, at Washington, D. C., December 28, 1911.